YOUR KEY *to* QUAIL HABITAT

2008

MISSOURI DEPARTMENT OF CONSERVATION

Without All Five, Quail Won't Thrive

Creating good quail habitat is like solving a jigsaw puzzle—you have to get all the pieces in the right places. Otherwise, the picture is incomplete. Quail have five basic habitat needs, and unless each is met, they won't thrive on your property. It's hard to solve a jigsaw puzzle if you don't have a picture of the original to guide your work. This calendar shows you the five essential quail habitat pieces and illustrates how they fit together. We hope you'll enjoy using it to put together good quail habitat on your place.

Nesting Habitat

Components

- Previous year's residual plant material
- Mixture of clumpy grasses, wildflowers and bare soil

Examples

- Two-year idle food plots
- Idle areas along fencerows and crop fields
- Native warm-season grass stands that haven't been burned for two years

Brood-rearing Habitat

Components

- Well-spaced plants with little foliage at ground level, but dense overhead foliage to shield chicks from predators
- Bare soil underneath to allow chicks to move easily
- Adjacent to nesting habitat

Examples

- Two-year idle food plots
- Legume or crop fields
- Fields with dense stands of annual weeds

Roosting Habitat

Components

- Weedy grasslands or dense stands of annual weeds
- Open canopy to allow quail to flush from predators
- Located on southern or southwestern slope

Examples

- Ragweed or goldenrod fields
- Native warm-season grass fields
- Brushy areas (particularly in winter)

Escape Cover

Components

- Dense stands of shrubs or briers
- Area at least 1500 square feet (50'x 30')
- One to three upright stems per square foot
- Bare soil at ground level

Examples

- American plum, dogwoods or sumac
- Blackberries
- Coral berry

Food and Water

Components

- Water available through food and dew
- Year 'round availability of seeds and insects
- Sparse duff or debris (because quail are poor scratchers)
- Food source located near escape cover

Examples

- Weedy edges along fencerows and crop fields
- Food plots, crop and legume fields
- Diverse native grass and wildflower stands

HABITAT
your key to
QUAIL

Keep Prairie Chickens Booming in Missouri

Hundreds of thousands of greater prairie chickens used to live in Missouri. Fewer than 500 remain, trapped in a few small islands of open grassland in the northern and southwestern parts of our state. Without active management from landowners in these key landscapes, this symbol of our prairie heritage likely will be lost from Missouri within the decade.

Charles Schwartz, the eminent Missouri artist and biologist, once said, "Prairie chickens don't look for land, they look for sky." He meant that the birds depend on open vistas and expansive, diverse grasslands, and survive best in areas with a minimum of brush and trees. In Missouri, much of this habitat has been converted to cropland or fescue. In addition, with the removal of fire from much of our landscape, encroaching trees have reduced open vistas, increasing the threat of predation. If prairie chickens are to survive in Missouri, restoring habitat over large areas is critical. Landowners can help by creating more nesting and brood habitat.

Nesting Habitat

Prairie chickens nest in a variety of grasses and legumes. Those include native warm-season grasses, smooth brome, winter wheat, alfalfa, redtop and timothy. Without proper management, all of these become too tall and thick to provide adequate nesting habitat.

Ideal nest sites provide concealment, plus an easy escape route from predators. Hens prefer vegetation that is 12 to 15 inches tall, and tend to avoid vegetation taller than 31 inches. Hens need standing dead vegetation to construct the nest, but excessive litter decreases nest success. Nests located at least 660 feet from trees are most successful. Woody cover taller than 15 feet should be removed, but scattered clumps of native shrubs are acceptable.

Prairie chickens use this same type of habitat for winter cover. Sparse vegetation allows them to move and forage easily, while nearby taller vegetation affords some protection from winter weather.

Brood Habitat

Chicks leave the nest and begin foraging just after hatching. Because of their small size, they need habitat that is relatively open at ground level (with an abundance of bare ground), but which also provides overhead cover 10 to 15 inches tall to protect them from predators.

Some examples of good brood habitat include weedy fallow crop fields, burned or grazed native prairie, the weedy edges of fields and field roads or cattle trails. Brood habitat should be situated as close as possible to nesting cover. The key to quality brood habitat is disturbance, which creates bare ground and fosters higher forb densities that support good insect numbers.

To provide high-quality nesting and brood habitat, incorporate the following practices into your management.

Haying:
- Use haying to control woody invasion, remove litter and increase forb diversity.
- Keep hay units less than 40 acres in size.
- Arrange hay units in a pattern to maximize edge for nesting sites.
- Hay between July 1 and Aug. 15, at a cutting height of 4 to 6 inches.

Burning:
- Burn to control woody invasion, remove litter and increase forb diversity and create brood habitat.
- Burn from mid-August to late March to reduce native grass density and increase forb diversity.
- Avoid burning large areas of nesting habitat at one time.
- Burn units should not be adjacent to hay units, but the two may meet on corners.

Mowing:
- Set your rotary mower at a height of 14 inches to create suitable nesting and winter habitat.
- Mow tall cover from August through September.
- Leave patches of taller vegetation to provide protection from harsh winter weather.

Grazing:
- Use grazing to improve nesting cover, reduce litter and create brood habitat. One AUM per 5.5 acres is recommended.
- Avoid deferred-rotation and management-intensive grazing in favor of patch-burn or rest-rotation grazing systems. Both of these leave adequate residual cover for nesting.
- Use fire to help focus cattle grazing in certain areas while other areas are left alone. This will create a mosaic of vegetative structure and diversity.

A few more ideas:
- Remove trees taller than 15 feet.
- Plant grasses and legumes that create good nesting and brood cover; avoid sod-forming grasses such as fescue, Bermuda and Old-World bluestems.
- Burn or strip disk CRP fields to create better brood cover.
- Leave 12 to15 inches of vegetation at the end of the growing season to provide next year's nesting cover.
- Consider patch-burn grazing to create nesting and brood-rearing habitat within the same pasture.

To learn more about prairie chicken management and possible cost-share programs in your area, contact your local MDC office.

Thick stands of shrubs such as gray dogwood, wild plum and blackberry are critical to the survival of quail and many songbirds. These thickets provide thermal protection when temperatures plummet, shade when temperatures soar and escape cover from predators yearlong.

JANUARY 2008

When evaluating your property's habitat for quail, think back to the childhood game of freeze tag. The most important part of the game is home base, because that's where you can't be tagged — you're safe. Quail engage in a high-stakes game of freeze tag daily. They win or lose based on whether they live or die. A playing field without a home base ensures predators will tag them. To give quail a home base, develop a "covey headquarters."

These are areas of dense, shrubby cover that quail can use to escape predators and temperature extremes. They need to be at least 1,500 square feet and have stems spaced 1 to 3 feet apart. Thickets of shrub dogwood, blackberry, sumac and American plum can provide good cover. However, quail can't move through dense ground vegetation, so spray the vegetation underneath with a glyphosate-based herbicide after the shrubs have gone dormant in the fall or before they green up in the spring.

Dropping large trees along a fencerow, edge feathering the zone between crop fields and woodlands, and planting shrubs all create effective headquarters. Remember, it's easier to win at freeze tag when home base is close to the playing field. So, create your headquarters close to where quail typically gather: disturbed ground (used when raising chicks) and native grasses (used when nesting and roosting).

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		Subscribe to the free *Covey Headquarters* newsletter. Use the subscription card on the back of this calendar. **1**	This month freezing temperatures and lack of cover contribute to the highest quail mortality of the year. **2**	A third of Missouri's quail population dies in November, December and January. **3**	**4**	In midwinter, quail coveys reduced to a few individuals will combine to form larger coveys. **5**
Place Christmas trees near brush piles to provide cover for quail and songbirds. **6**	Prairie chickens can be found feeding in crop stubble. **7**	Dense stands of plum and dogwood provide shelter for quail coveys during severe weather. **8**	If your property lacks dense, shrubby "covey headquarters," make plans to plant some this spring. **9**	Annual survival of bobwhite quail in Missouri ranges from 5 to 25 percent. **10**	Now is the perfect time to edge feather the wooded areas of your property. **11**	Ticks may be active in southern Missouri during mild winters. **12**
13	Coveys must have five to 10 individuals to generate enough heat to survive cold winter nights. **14**	**15**	Raccoons breed through March. **16**	Seed legumes such as annual lespedeza and clover at a rate of 4 pounds to the acre over newly fallen snow. **17**	Legumes provide food for quail. Adults eat the seeds; chicks pick insects from the foliage. **18**	Plan to plant several food plots of millet or milo near your legumes. This will provide excellent brood-rearing habitat. **19**
Prairie chickens may visit booming grounds on warm, mild days. **20**	To increase bluestem in your warm-season grass fields, burn now through the first week of February. **21**	Little bluestem provides excellent nesting habitat for quail, prairie chickens and other ground nesters. **22**	Leave last year's food plots idle this year. To provide excellent brood-rearing habitat, overseed them with clover and annual lespedeza. **23**	Bobcats breed through June. **24**	Watch for snowy owls flying over prairies. These large, white owls migrate to Missouri when food is scarce in the Arctic. **25**	**26**
27	**28**	Quail do well in native grass stands when there is a variety of wildflowers and legumes. Burn to provide this habitat before March 15. **29**	Contact your MDC private land conservationist or MU extension office for the dates of upcoming Master Wildlifer programs. **30**	Visit the Conservation Department online at *missouriconservation.org*. **31**		

DECEMBER

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FEBRUARY 2008

Pound for pound, barn owls eat more rodents than any other owl in Missouri. You can adopt your own "all natural" pest control by encouraging these secretive predators to nest in your barn loft, grain elevator or silo. To get plans for a barn-owl nest box, contact your local MDC office and ask for **Woodworking for Wildlife.**

Barn owls, which live throughout the world, are year 'round residents of Missouri. Their light color, hissing vocalizations and flat, white face have earned them the nickname "ghost owl." They hunt at night, usually leaving the roost site an hour or more after sunset. Barn owls not only have excellent night vision, but they also can find and catch prey by sound alone. They feed on small mammals such as voles, mice, shrews, rats and gophers, and can be a strong ally to landowners by controlling rodent outbreaks around stored grain or abandoned buildings.

Barn owls have the ability to reproduce any time of year, allowing them to take advantage of high rodent populations. With mild weather and plentiful prey, these owls will re-nest several times each year. Despite this high reproductive ability, barn owl numbers remain low throughout the state. One reason is because barn owls store less body fat than other owls. When heavy snows and low temperatures cause prey to become scarce, barn owls often starve to death. In addition, the removal of old farm buildings, cleaner farming methods and the increased use of rodent-killing poisons all have taken a heavy toll on barn owl numbers.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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3	Spring wildfire season begins when there is no snow and lasts until green-up. **4**	Spring prescribed-burning season soon will be here. Contact local MDC or NRCS offices for dates of upcoming burn workshops. **5**	● **6**	Research shows that quail with access to "weedy" fields have more fat than birds in agricultural fields. **7**	**8**	Food has become scarce for all wildlife. **9**
When planning your food plots, put them next to good escape and nesting cover. **10**	**11**	Northern harriers begin migrating. Watch for them swooping low over grasslands now through May. **12**	◐ **13**	Coyotes breed through March; listen for their howling at night. **14**	Barn owls nest at any time of the year in Missouri, but usually March through July. **15**	Barn owl courtship begins a month before egg laying. **16**
17	**18**	Opossums begin breeding in wooded areas along streams. **19**	○ **20**	Begin setting up bluebird nest boxes. Space them at least 300 feet apart to account for the bird's sizeable territory. **21**	**22**	Skunks breed through late March. **23**
24	**25**	Barn owls use cavities in trees, church steeples, attics, grain elevators and barn lofts for their nests. **26**	Barn owls also use nest boxes. Now is a good time to put one up. **27**	To learn how to build and where to put up a barn owl box, contact your local MDC office and request a copy of *Woodworking for Wildlife*. ◑ **28**	Barn owls will reuse the same nest for many years. **29**	

As the first day of spring approaches, surviving quail begin thinking about the breeding season. Coveys soon will break up, and mating pairs will begin to form.

MARCH 2008

Spring brings change. Snow melts, temperatures rise and dormant vegetation begins to green up. Bobwhites also undergo changes — in their habits, habitat and diet.

Coveys that once kept groups of quail protected from predators and warm throughout the winter begin to break up. Males set about establishing territories and defending them vigorously against other males. You'll know spring has finally arrived when you hear their familiar "bob-WHITE" call, which they repeat over and over to attract interested hens.

Females, meanwhile, begin searching for good nest sites. They look for habitat that has a mixture of grasses, wildflowers, legumes, bare soil and scattered small shrubs. Each of these components is important for nesting, feeding and rearing their young.

Seeds and other carbohydrate-rich plant materials — which quail have used to fuel their metabolisms during the cold winter months — are becoming difficult to find. At this time quail make an important dietary switch and begin eating insects. Compared to seeds, insects contain higher levels of protein. An increased level of protein in their diet triggers quail to undergo physiological changes that prepare them for breeding and egg laying.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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2	3	4	Male greater prairie chickens gather on booming grounds to dance, call and fight for females. 5	Bobolinks begin their 5,000-mile migration from South America. 6	Burn or lightly disk to provide bare ground and annual weeds for quail and other grassland birds. Try to finish before April 30. ● 7	8
Ticks begin to appear — time to put on the bug spray. 9	Disk food plot areas that will be planted early, such as those for corn or sunflowers. 10	11	Listen for the "booming" of male prairie chickens now through mid-April. 12	Call your local Conservation Department office to find out where to see prairie chicken courtship. 13	Spray musk thistle and teasel while they are still in the rosette stage. ◐ 14	Plant tree and shrub seedlings now through May to provide escape and thermal cover for quail and other grassland birds. 15
Spray rank stands of cool-season grass now through April with herbicide to retard growth. 16	Seed cool-season grass through May 31. 17	Barn owls begin laying one egg every two to three days for a total of five to seven eggs. 18	Barn owl eggs start out white, but often become blackened during incubation. 19	**FIRST DAY OF SPRING/VERNAL EQUINOX: day and night are equal in length.** 20	Barn owls begin incubation soon after the first egg is laid; this will continue for about 30 to 34 days until the last egg laid hatches. ○ 21	Only female barn owls incubate the eggs. Male barn owls provide the female with food during incubation. 22
23	24	Badgers bear young through early April. 25	26	Wild plums begin blooming along fencerows and in covey headquarter plantings. 27	28	◑ 29
Male bobwhites select elevated perches from which to whistle to hens. 30	Conclude spring legume overseeding. Average day of last frost in southern Missouri. 31					

Are male quail deadbeat dads? Recent research says not. In fact, male bobwhites take an active role in parenting, incubating 25 percent of all nests and providing generous care to newly hatched chicks.

APRIL 2008

Quail have a long list of predators which include raccoons, opossums, bobcats, foxes, crows, cotton rats, hawks, owls, cats, snakes and even ants. To compensate, quail reproduce at an incredible rate. Some studies have shown that quail can increase their population size 300 percent in a single breeding season! How do they do this?

Hens lay a large clutch of eggs. Although 14 are average for Missouri, hens have been known to lay nests of more than 20 eggs.

Recent studies show hens are promiscuous. While their mate incubates a first nest, females go away to breed with a second male and lay another clutch of eggs. When the chicks hatch, all three parents share in the child-rearing duties.

Quail are persistent re-nesters. When their first nest is lost to predators or weather, hens attempt to nest a second or even third time. They also re-nest after successfully hatching their first brood, either abandoning the chicks after two or three weeks or dumping them in with another female's brood. This may sound risky for young chicks, but studies show that by the time they're 2 to 3 weeks old, most chicks can fend for themselves. In fact, at this point, a chick's survival chance is about 50 percent whether they get parental care or not. What does increase the odds for orphan chicks is good habitat. Bare ground, well-spaced annual weeds and a dense overhead canopy of foliage can tip the balance in their favor.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		Bobwhite quail begin calling: males whistle, "ah-bob-white"; females return a series of three to four low, clear whistles. **1**	About 33 percent of adult bobwhites survive the breeding season. **2**	Nesting cover for bobwhites needs to be at least 12 inches tall. **3**	Contact your local conservation agent or private land conservationist about free food-plot seed. **4**	Prairie chicken hens begin looking for nest sites in vegetation at least 10 to 15 inches tall; they will avoid vegetation taller than 31 inches. ● **5**
Prairie chicken nests that are located at least 660 feet from trees are the most successful. **6**	Plant corn after soil temperature rises above 55 degrees. **7**	Burn cool-season grasses when they reach "boot height" (6 to 10 inches) to severely stunt growth. **8**	If you can't burn, spray strips of cool-season grasses with herbicide to provide bare ground where annual plants can flourish. **9**	To eradicate fescue, burn now through mid-May; then spray with herbicide after green-up. **10**	Bobwhites begin nesting. Hens locate their nests in clumps of grass near bare ground. **11**	Plant sunflowers at 16,000 seeds per acre or broadcast at 10 pounds per acre. Sunflowers provide food for doves, songbirds and quail. ◐ **12**
Planting your food plots with seed mixes increases the odds of successful food production. **13**	Male and female northern harriers begin working together to construct a nest. **14**	Begin seeding native warm-season grass now through June. **15**	Prairie chicken hens begin laying 10 to 12 greenish-brown eggs in shallow, saucer-shaped nests. **16**	**17**	Northern harriers begin laying four to five bluish-white eggs, some of which will be spotted with brown. **18**	Northern harriers are ground nesters that seek elevated nest sites with dense, new-growth vegetation. **19**
Average day of last frost in northern Missouri. ○ **20**	Northern harriers will add one egg every two to three days. They begin incubation soon after the first egg is laid. **21**	Of the quail that have survived to this point, about 40 percent of females and 13 percent of males will hatch one or more nests. **22**	Male scissor-tailed flycatchers begin arriving from Mexico and Central America. **23**	Barn owl eggs begin to hatch in the order that they were laid. The female will take care of the young for 25 days. **24**	Some cool-season grasses such as orchard grass, timothy and redtop offer good nesting habitat for grassland birds. **25**	Prairie chicken hens begin incubation; chicks will hatch out in 23 to 25 days. **26**
Burn warm-season grass fields to check invading cool-season grass. **27**	Bell's vireos begin arriving from Mexico. Males will arrive first, several days before the females. ◑ **28**	While female northern harriers incubate their eggs, male harriers provide them with food. **29**	Last day to manage CRP fields until July 16. **30**			

MARCH

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Bell's vireos migrate from Central America to Missouri each spring to raise their young. They nest in dense, low-growing shrubs found in brushy field borders, along the edges of rivers and streams, and open woodlands. Loss of this habitat has triggered sharp declines in Bell's vireo populations.

MAY 2008

If you're out and hear a bird whistle a question (zweedle-zweedle-zweedle-zoo?) and then proceed to answer it (zweedle-zweedle-zweedle-zee!), you've likely heard a Bell's vireo. Named after J. G. Bell — who accompanied ornithologist John James Audubon up the Missouri River in the 1840s — these birds rely on dense, shrubby habitat in which to nest and forage. Losses of this habitat in Missouri and throughout the country have resulted in sharp declines in Bell's vireo populations.

Vireo is derived from the Latin word for green. True to their name, Bell's vireos have a grayish-green back and pale belly. Though smaller than a sparrow, Bell's vireos are voracious predators, foraging nearly nonstop for insects and spiders.

Both male and female vireos construct a hanging nest of leaves, grasses and strips of bark. Spider silk is used to hold the nest together, and spider egg sacks are used to "decorate" the nest. Some ornithologists hypothesize that the hatching spiders reduce nest parasites or provide a ready source of food for hungry chicks. Both parents incubate the eggs and take care of the young chicks when they hatch.

Bell's vireos often fall victim to brown-headed cowbirds — nest parasites that lay their eggs in the nests of other birds. Often, this causes vireos to abandon the nest. When vireos do incubate the eggs, the cowbird chick that hatches often outcompetes smaller vireo chicks for food, causing them to starve. Large patches of thick, shrubby habitat make it harder for cowbirds to find vireo nests.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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Little bluestem, sideoats grama and broomsedge provide good nesting sites for birds such as quail and prairie chickens. **4**	Plant food plots now through June. ● **5**	Male and female scissor-tailed flycatchers search for isolated trees or shrubs in open grasslands in which to construct a nest. **6**	Coyotes bear young. **7**	Quail prefer to nest within 50 to 75 feet of an opening or edge. **8**	**9**	Male and female Bell's vireos work together to choose a nest site and construct the nest. **10**
Bobolinks begin to arrive. Males will arrive at least a week before females. ◐ **11**	Wild strawberries begin ripening in diverse grasslands. **12**	After three days of nest construction, Bell's vireo females begin laying one egg per day for four days. Both males and females will incubate the eggs for 14 days. **13**	Plant or drill milo and forage sorghum at 7 pounds to the acre or broadcast seed at 8-10 pounds to the acre. **14**	Last day to plant cool-season grasses and legumes. **15**	Bobwhites begin incubating eggs after the last one is laid. Incubation takes 23 days. **16**	Bobwhite males incubate about 25 percent of all nests. **17**
Female scissor-tailed flycatchers begin building cup-shaped nests. It takes two to four days to complete. **18**	Northern harriers begin hatching. To protect the young, parents roost away from the nest, returning only to deliver food to the hungry chicks. ○ **19**	Greater prairie chickens begin hatching. Chicks will remain with the hen for eight to 10 weeks. **20**	Female scissor-tailed flycatchers lay one egg per day until a clutch of three to five eggs is laid. **21**	Quail average two to three nest attempts to produce one successful hatch. **22**	Predation accounts for the majority of failed quail nests. About 20 species are known to eat quail eggs. **23**	Female scissor-tailed flycatchers begin incubating their eggs. Chicks will hatch in 14 to 17 days. **24**
Quail chicks begin hatching. Newly hatched chicks, about the size of a bumblebee, are fully mobile. **25**	Start looking for quail chicks! Record the date, location and number of chicks in each brood you see. **26**	Bell's vireos begin to hatch. Both the male and female will brood and feed the chicks. ◑ **27**	Plant or drill soybeans at 30 pounds to the acre or broadcast seed at 30 to 35 pounds to the acre. **28**	**29**	Look for pale purple coneflower blooming in your prairie stands. Native Americans used it to treat snakebites; songbirds feast on its seeds. **30**	Coyote pups begin emerging from dens. **31**

JUNE 2008

Comparing newly hatched quail to cheese puffs isn't much of a stretch. They're about the same size and taste good to predators. Annual plants, such as ragweed, provide a dense canopy overhead and plenty of bare ground underneath — the proper conditions to prevent newborn quail from becoming a snack.

Believe it or not, the scientific name for ragweed, *Ambrosia*, means "food of the gods." Though allergy sufferers everywhere probably have other names for ragweed, quail probably would agree. From chick to adult, ragweed provides something for every stage of a quail's life.

In early spring, when hen quail are busy selecting clumps of grass in which to nest, new plants are just starting to germinate in the surrounding soil. Many of these likely will be ragweed. A couple of months later, when quail chicks leave the nest, ragweed has grown enough to offer a dense canopy of foliage that screens the fragile chicks from sun and predators.

Newborn quail feed almost exclusively on insects for the first few weeks after hatching. This provides protein needed for rapid growth. Ragweed, with its lush foliage and abundant flowers, lures countless insects to their demise down the gullets of hungry quail chicks.

By the time they develop flight feathers, young chicks switch from eating insects to eating seeds. The high carbohydrate content of seeds helps quail maintain their body temperature when the mercury plummets. By this time, many ragweed plants have gone to seed, providing quail with a bounty of food for the winter.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Female bobolinks choose a nest site. They look for a slight depression on the ground surrounded by tall grass and forbs. **1**	Bobolinks often return to the same area each year to nest. **2**	To get an idea of how many quail survived the winter, conduct whistle counts this month. ● **3**	**4**	Bobolinks begin laying one egg per day for five or six days. Incubation will begin after the last egg is laid. **5**	The mature seeds of tickseed coreopsis resemble ticks, but quail and other birds eat them anyway. It blooms through early July. **6**	Red fox kits begin hunting with their parents. **7**
Watch for the reddish orange blooms of butterfly milkweed along roadsides and in diverse grasslands now through August. **8**	Scissor-tailed flycatchers begin hatching. Males assist females with feeding the young. **9**	Female bobolinks begin incubating eggs. Incubation will last for 10 to 13 days. ◐ **10**	Barn owls will start a second clutch 75 to 80 days after laying their first. **11**	If food supplies and weather conditions are favorable, barn owls will nest at least twice a year in Missouri. **12**	Spray *sericea lespedeza* with tryclopyr (Remedy) in your grass stands now through September to kill the weed and leave the grass. **13**	Bell's vireo chicks begin leaving the nest. Parents continue to feed the young for 20 to 30 days. **14**
Bobwhite quail hatch is at its peak. **15**	Although quail chicks are mobile at hatching, they still need help regulating body temperature. Watch for parents shading the chicks with their wings. **16**	Both male and female quail provide parental care to their chicks. Still, only 36 to 55 percent of the chicks will survive the first three weeks of life. **17**	Fifty-five days after hatching, barn owls are strong enough to fly. ○ **18**	**19**	**FIRST DAY OF SUMMER/ SOLSTICE: today is the longest day of the year.** **20**	Many wildflowers and quail-friendly plants are in bloom. This is a good time to work on plant identification. **21**
Bobolinks begin hatching. **22**	Female coyotes wean their pups. **23**	Scissor-tailed flycatcher young begin leaving the nest. **24**	Gray-headed coneflower is a great seed source for wildlife and good forage for livestock. It blooms now through September. **25**	Young northern harriers begin to fly. Parents still provide them most of their food. ◑ **26**	**27**	**28**
Many quail chicks are able to fly and regulate their body temperature by now. **29**	Last day to plant warm-season grass. **30**					

MAY

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JULY

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Allowing cattle to graze native prairie will accomplish two things: fat cows and better prairie-chicken habitat. Grazing opens areas in dense grass stands, resulting in more bare ground, native wildflowers and insects — everything a prairie chicken needs to raise her chicks.

JULY 2008

Charles Schwartz, the eminent Missouri artist and biologist, once said, "Prairie chickens don't look for land, they look for sky." He meant that the birds need large tracts of open, diverse grassland — usually more than 160 acres — in which to nest, rear their young and hide from predators. When settlers rolled across the state in covered wagons, the "booming" of male prairie chickens during spring courtship was likely deafening. Then, tens of thousands of the birds occupied every county that contained prairie.

Only a few hundred remain, trapped in small islands of prairie scattered in the northwestern and southwestern corners of our state. Grasslands that meet the needs of nesting hens and young broods have become so scarce that biologists worry that prairie chickens could become extinct in Missouri by as early as 2009.

Landowners can help prairie chickens by creating more nesting and brood-rearing habitat on their property. This will benefit not only prairie chickens, but also a whole suite of grassland birds that include bobwhite quail, Bell's vireos and bobolinks. To find out how to create this kind of habitat, turn to the front of the calendar.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		Sideoats grama blooms through September. 1	Young bobolinks begin leaving the nest 10 to 11 days after hatching. ● 2	Excessive June and July rainfall may shift the quail hatch to August. 3	When haying fields used by prairie chickens, cut at least 4 to 6 inches high. 4	Quail and other grassland birds continue to nest; resist the temptation to mow this month. 5
Thirteen to 16 days after hatching, young bobolinks are able to fly. 6	Watch for quail chicks chasing insects in the bare ground under vegetation. 7	Insects make up 80 to 95 percent of a quail's diet during its first few weeks of life. 8	◐ 9	Woody cover helps quail regulate their body temperature. Shaded areas can be 30 to 50 degrees cooler at ground level than unshaded fields. 10	11	Monarch butterfly larvae become poisonous as a result of eating the leaves of the butterfly milkweed, one of their host plants. 12
13	Quail hens may require surface water for late-season egg laying. Usually, quail get their water from dew, insects and other foods. 14	In normal years, the peak of quail nesting is coming to an end. 15	Lightly disk CRP fields through the end of December. 16	Prairie blazing star blooms along roadsides and prairies through October. 17	Young barn owls become independent of their parents between 76 and 86 days of age. ○ 18	Spray rank stands of warm-season grass with herbicide now through Sept. 15 to temporarily retard growth. 19
20	By now, most prairie chicken broods have feathers and can fly short distances. 21	22	Nest incubation by male bobwhites is most common in July. 23	Temperatures above 100 degrees in July and August can reduce quail nesting activity. 24	Purple prairie clover, a native legume found in diverse prairies, typically grows 2 feet tall, but its taproot can reach 10 feet into the soil. ◑ 25	Consider disking winter wheat fields now in preparation for fall planting. 26
27	Wild plums ripen. 28	29	30	Bobwhite may renest. 31		

JUNE

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AUGUST

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This month bobolinks gather in flocks, preparing to leave their nesting grounds in northern Missouri to winter in balmy Brazil and Argentina. Although bobolinks likely navigate by the Earth's magnetic field, the bobolink perched atop this compass plant could use the plant's large basal leaves, which generally point north and south.

AUGUST 2008

If you live in the northern third of the state, you've probably seen a small black, white and yellow bird singing on a strand of barbed wire. That bird — about the size of a blackbird — is a bobolink. They have dark undersides and a white patch on their backs. These markings make them different from other songbirds — most of which are dark on top and light underneath.

Each spring bobolinks make an extraordinary migration, traveling thousands of miles from Brazil and Argentina to nest in the northern United States and Canada. They nest on the ground in the dense vegetation of open hayfields, wet meadows and pastures. This ties their success to hay operations. Since haying begins later farther north, bobolink nesting success seems to be better there. They typically raise one brood per year, but females who start early sometimes pull off a second brood.

Bobolinks once were more numerous, but large numbers have been killed in southern rice fields as agricultural pests, sold as pets in Argentina and collected for food in Jamaica. These factors, along with habitat loss in the breeding grounds, have caused biologists to worry about continued declines in their numbers.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JULY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30				Plant cool-season grasses such as timothy, redtop and orchard grass through Oct. 1. ● 1	Little bluestem blooms through September. 2
3	Conservation agents conduct roadside surveys to assess quail populations this month. 4	August is a good month to use prescribed burns to set back woody vegetation in your grass stands. 5	Mow small portions of mature sunflower fields periodically throughout the month to attract doves and other birds. 6	Illinois bundleflower seeds provide excellent protein for wildlife and livestock. 7	Burning native warm-season grasses when they are in bloom will reduce the amount of regrowth the following year. ◐ 8	Bobwhite nesting persists and a second peak in hatching occurs this month. 9
Prepare firelines for fall and spring prescribed burns. 10	Migrating northern harriers begin showing up, swooping low over grasslands and wetlands to look for rodents. 11	Northern harriers usually migrate by themselves. 12	Greater prairie chicken broods disperse. 13	To control large stands of *sericea lespedeza*, burn this month; then spray the regrowth in three to four weeks. 14	Bobolinks begin forming large migratory flocks with blackbirds and swallows near wetland sites. 15	The earliest hatches of quail chicks now resemble adults. ○ 16
17	18	19	Bell's vireos begin leaving the northern portion of their breeding range to migrate south to southern Mexico. 20	21	If you've lost your sense of direction, look for a compass plant. Its leaves often orient in a north-south direction. 22	◑ 23
24	"Turkey feet" seed heads of big bluestem mature. 25	26	Disk, burn or mow mature wheat fields to attract doves. Consider leaving some wheat standing adjacent to escape cover for quail. 27	28	Scissor-tailed flycatchers gather into pre-migratory flocks. Flocks can contain several hundred birds. 29	● 30
31						

SEPTEMBER 2008

With the precision of a jet fighter, scissor-tailed flycatchers swoop over grasslands to capture and consume vast quantities of grasshoppers, moths, beetles, locusts, cotton worms and other harmful crop pests.

More than half of a scissor-tailed flycatcher is tail. And, it's this tail—which can grow to 9 inches long—that will catch your attention, even if you don't consider yourself a birdwatcher. Sometimes this can be a bad thing. In the late 1800s, flycatchers caught the attention of women who sought long feathers with which to decorate their fancy hats. To fuel the fashion craze, thousands of the little birds were killed. Their numbers have rebounded, and scissor-tailed flycatchers seem to be slowly expanding their range northward and eastward in Missouri's grasslands.

When perched, scissor-tailed flycatchers hold their tail feathers together. On the wing, however, they split them apart like the blades of scissors, using them to perform jetlike aerial maneuvers to catch grasshoppers and other insects to eat. Males also use their tail feathers — which are slightly longer than the female's — to perform a breathtaking sky dance, which includes steep dives, summersaults and barrel rolls.

Scissor-tailed flycatchers aggressively defend their territories, teaming up to harass large intruders such as hawks, turkey vultures and American crows. They easily out-maneuver the larger birds, pecking at their backs to drive them away.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	Burn or disk warm-season grass stands to increase plant diversity. **1**	Fall and winter burns reduce native grass vigor, giving legumes and wildflowers a chance. **2**	Grassland birds such as quail prefer stands that have a mix of native grasses and wildflowers. **3**	Leave a few rows of standing crop next to dense, woody cover to benefit quail during winter. **4**	Quail roost on the ground at night in patches of ragweed, goldenrod and warm-season grasses. **5**	Quail prefer to roost where the canopy is open, allowing easy escape from nighttime predators. **6**
◐ **7**	Monarch butterflies begin migrating to their wintering grounds in Mexico. **8**	Mow next spring's prairie chicken nesting cover down to 10 to 15 inches high. **9**	Spray burned *sericea lespedeza* stands with Pasture Guard, Remedy or Surmount. Follow label rates. **10**	Lone quail burn extra energy to stay warm when the temperature falls below 70 degrees. **11**	Butterflies are drawn to the pale purple blooms of rough blazing star; songbirds eat its seeds. **12**	**13**
In stable populations, prairie chickens visit their leks and boom sporadically now through November. **14**	○ **15**	Large flocks of bobolinks begin their 5,000-mile migration to South America. **16**	Begin seeding winter wheat in food plots and firelines at 60 to 70 pounds to the acre. **17**	**18**	For a fee, conservation contractors can help implement your habitat management plan. **19**	To locate a conservation contractor, go to *missouriconservation.org* and type "conservation contractor" in the search field. **20**
21	**FIRST DAY OF FALL/AUTUMNAL EQUINOX: day and night are equal in length.** ◑ **22**	**23**	**24**	**25**	**26**	**27**
28	Scissor-tailed flycather flocks begin migrating to Mexico and Central America. ● **29**	Dogwoods begin to show purple and red fall colors. **30**				

AUGUST

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OCTOBER

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Your mother was only half right when she warned you never to play with fire. With adequate planning and careful use, prescribed fire can be an excellent habitat management tool. Used correctly, it can stimulate the growth of desired plants or set back unwanted vegetation.

OCTOBER 2008

Though most recognize the value of prescribed fire to manage grassland habitat, few know how to time its use to achieve the results they desire. Understanding the life cycle of prairie plants helps you know when fire will benefit or hurt them.

Most prairie plants store their energy in their roots or their seeds. Except in rare occasions, fire affects only aboveground growth. If a plant is dormant, fire cannot reach the underground energy stored in its roots. Conversely, if a plant is funneling energy into seed production, fire can seriously damage the plant before it has a chance to replenish its energy supply.

Cool-season grasses such as fescue and smooth brome produce early spring growth, late spring seed production and become semi-dormant during the hot summer months. They follow this with early fall growth to replenish energy reserves in the roots. This explains why there are two periods each year to damage cool-season grasses. The first is in late spring when cool-season grasses are producing seeds; the second is during fall re-growth, when they replenish their energy reserves.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	NOVEMBER S M T W T F S 1 2 3 4 5 6 7 8 10 11 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30		Spray rank stands of cool-season grass now through November to temporarily retard growth. **1**	To eradicate fescue, burn now through the end of the month; then spray with herbicide after green-up. **2**	Spray or disk areas for spring shrub plantings. **3**	Prepare areas for edge feathering by spraying to kill grasses before felling trees. **4**
October is a banner month for quail. Population numbers peak, cover is plentiful and very few birds die. **5**	**6**	◐ **7**	A few quail nests hatch in October. **8**	**9**	Watch for unusual birds this month. **10**	The "fall shuffle" is in effect. Family groups of quail are breaking up, and winter coveys of 10 to 20 birds are forming. **11**
Conduct fall covey counts the last three weeks of October and the first week of November. **12**	**13**	Average day of first frost in northern Missouri. ○ **14**	**15**	Crop fields are harvested and annual plants begin leaf drop. Covey headquarters become vital for predator escape and winter weather survival. **16**	Aromatic aster, which provides nectar for late-migrating monarch butterflies, will flower long after the first frost. **17**	**18**
Spray warm-season grass stands after the first frost to eliminate cool-season grasses. **19**	**20**	◑ **21**	Prepare for winter tree-cutting operations: sharpen your chainsaw and buy chemicals for stump treatment. **22**	**23**	**24**	Check the *Missouri Hunting and Trapping Regulations* to find out when quail and furbearer trapping seasons open. **25**
26	**27**	● **28**	Average day of first frost in southern Missouri. **29**	**30**	Spray brome and fescue in fencelines and under shrubs after leaf drop. **31**	

NOVEMBER
2008

Though they frequent covey headquarters throughout the day, quail rarely stay in dense cover at night. Instead, they typically roost in crop and sparse grass fields where there is little overhead cover. Here, they use camouflage and remain motionless to avoid detection; if a predator comes lurking in the night, they have clear airspace in which to escape.

When nighttime temperatures begin to drop, it becomes increasingly important for quail to select high-quality roosting sites. Quail spend a great deal of their lives underneath dense overhead canopy cover, except when roosting. Instead, research shows that quail prefer to roost in crop fields, grasslands and old field sites that have a sparse overhead canopy. To combat predators in this highly exposed habitat, quail rely on camouflage and remain virtually motionless. The lack of obstructions overhead becomes important when predators flush the covey in the dark.

Weedy grasslands make ideal roosting habitat. These sites include a mixture of grasses and forbs such as goldenrod, daisy fleabane or ragweed. Sturdy-stemmed forbs such as these become important during ice or snow because they maintain their upright structure and offer cover for roosting coveys.

Quail prefer to sleep on bare ground that has absorbed the sun's heat or in vegetative litter, which offers insulation against frozen soil. Quail favor roosts that are out of the wind, which are usually located mid-slope or lower. They also seem to pick locations that face south or southwest, probably because the afternoon sun warms these sites right before quail head to bed.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					When cleaning harvested quail, pay attention to what seeds are present in their crops so you know what they have been eating. 1
Humans aren't the only ones hunting quail; studies show that about 5 percent of a Cooper's hawk's diet consists of bobwhites. 2	Coyotes and red-tailed hawks remove or displace many other predators that prey upon quail. 3	Winterize your spray equipment to prevent damage during freezing temperatures. 4	Burn warm-season grass stands to benefit native wildflowers. ◐ 5	When the temperature drops, begin chainsaw projects such as edge feathering, fencerow renovation and TSI. 6	7	Disk rank stands of cool-season grass after the first hard freeze. Exposing the roots to frost will kill some of the plants. 8
9	When quail are flushed, observe to what cover they escape. Providing more of this habitat can reduce quail predation. 10	11	Barn owls prey upon small mammals, especially mice and voles. 12	A barn owl's ability to locate prey by sound alone is the most accurate of any animal tested. ○ 13	Barn owls have excellent low-light vision. 14	Basal spray undesirable trees according to herbicide label now through March. 15
16	17	18	◑ 19	Remove trees 15 feet or taller from prairie chicken habitat. 20	Butterfly milkweed pods open, scattering their fluffy seeds in the wind. 21	22
23			Order tree seedlings from the George O. White State Forest Nursery. 26	Barn owls hunt mostly at night, often from an hour after sunset until an hour before sunrise. ● 27	28	29
30	24	25				

Northern harriers often swoop low over wetlands, prairies and fields when they migrate through Missouri in the spring and fall. The success of the few pairs that nest in the state is strongly influenced by the availability of adequate habitat and plentiful prey such as mice, voles and rats.

DECEMBER 2008

The distinct white rump patch of northern harriers distinguishes them from other birds of prey — even at long distances. Adult males can be identified by their coloring — light gray above, white below, with black wing tips. Juveniles and females are brown above, with a cream-colored belly streaked with brown.

As the common name suggests, "marsh hawks" can be found in marshes and other wetlands. They also frequent meadows, prairies and cultivated fields. Harriers are most visible when they swoop low over the ground, maintaining altitude with a few wing beats followed by a short glide. Similar to turkey vultures, harriers hold their wings in a slight V shape as they soar.

Unlike other raptors, which rely solely on razor-sharp eyesight, northern harriers often use sound to locate their prey. This is accomplished with an owl-like facial disk that funnels sound waves to ears located at either side of their head. Hunting by ear allows harriers to search for prey before sunrise or after sunset, which decreases competition with other raptors. It also helps them locate prey in tall vegetation such as grasslands, where visibility is limited.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	Go to *grownative.org* to learn more about native plants for your garden or field plantings. **1**	*Grownative.org* provides lists of nurseries that supply Missouri native plants and seed. **2**	**3**	Covey headquarters should be a minimum of 1,500 square feet with one to three upright stems per square foot. **4**	◐ **5**	Quail with native wildflower seed in their diet have higher body fat than quail that eat only row crops. **6**
Higher body fat increases survival odds during severe winters. **7**	**8**	**9**	Begin overseeding native wildflowers on top of newly fallen snow. **10**	**11**	○ **12**	A barn owl's flight is silent to human ears. **13**
14	Seed cool-season grasses through March 1. **15**	Although barn owls are a year 'round resident, Missouri is at the northern edge of their range. **16**	Barn owls store less body fat than other owls and cannot survive long periods of snow and cold temperatures. **17**	Barn owls starve to death after a week of no food. **18**	◑ **19**	**20**
FIRST DAY OF WINTER/ SOLSTICE: today is the shortest day of the year. **21**	**22**	**23**	**24**	Red foxes begin mating this month. Listen for their barks and squalls. **25**	**26**	● **27**
28	**29**	Blackberry and coral berry provide winter cover for quail to escape predators. **30**	Hang up next year's *Your Key to Quail Habitat* calendar. **31**			

NOVEMBER

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JANUARY

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Help Quail by Forming a Co-op

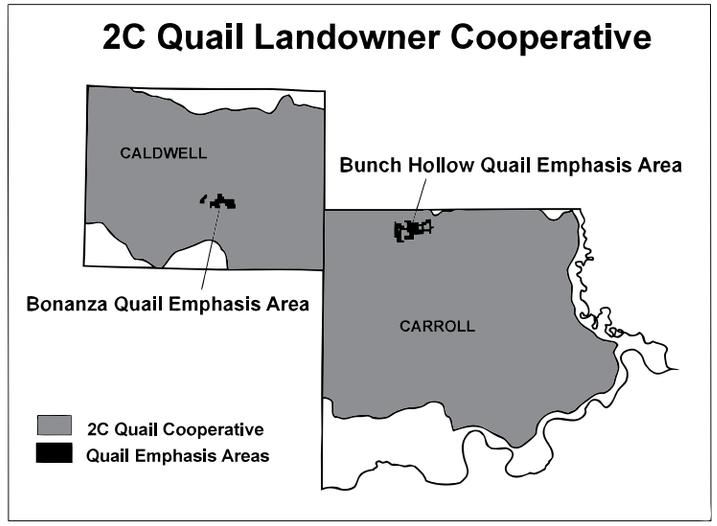
Phrases such as "Where have they all gone?" and "It's nothing like the good old days" have become commonplace when discussing quail populations. Rather than bemoan the decline of quail, landowners in northwestern Missouri are doing something to reverse the trend.

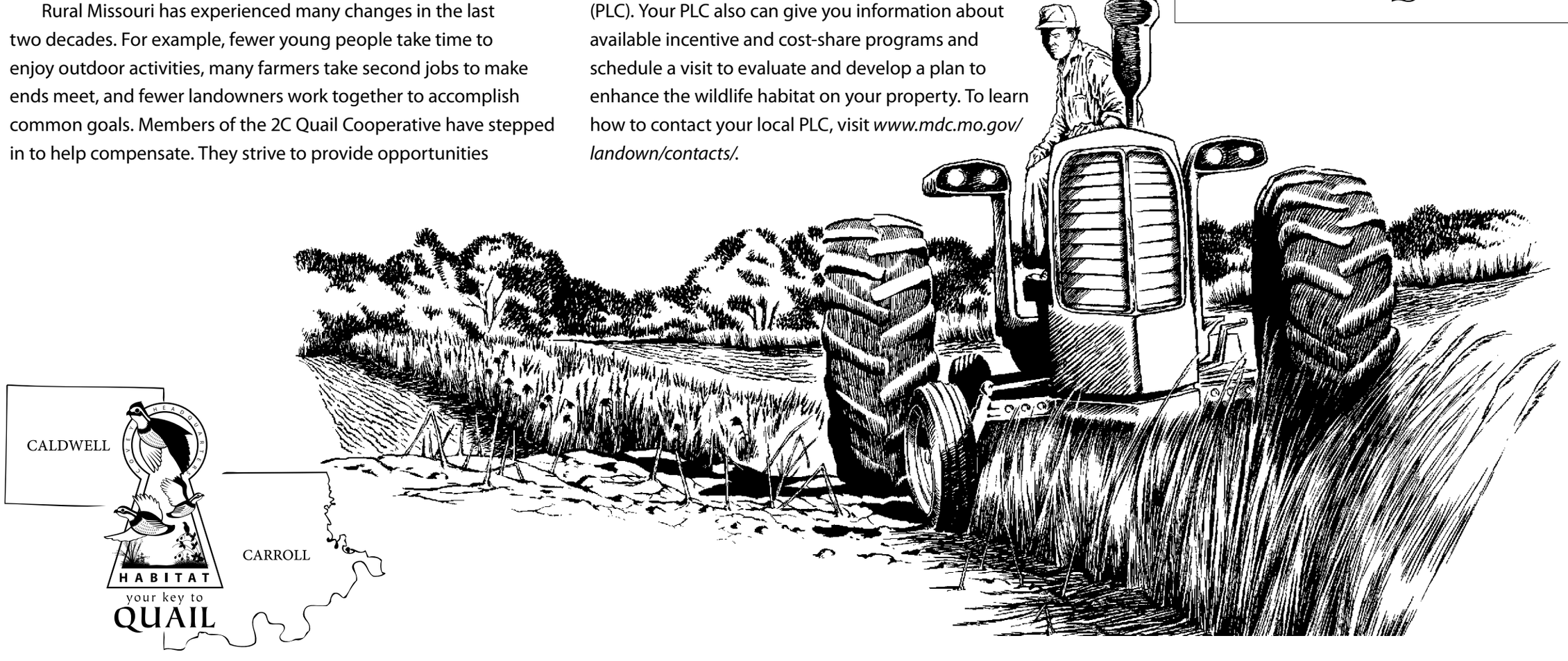
Not too long ago, landowners banded together to help each other work cattle. Neighbors combined equipment and labor, moving from one farm to the next until each farmer's cattle were finished. This system of sharing equipment, labor and experience worked well with cattle. There's no reason it shouldn't work for quail. In fact, it forms the strategy for the 2C Quail Cooperative of Carroll and Caldwell counties in the northwestern corner of the state.

Rural Missouri has experienced many changes in the last two decades. For example, fewer young people take time to enjoy outdoor activities, many farmers take second jobs to make ends meet, and fewer landowners work together to accomplish common goals. Members of the 2C Quail Cooperative have stepped in to help compensate. They strive to provide opportunities for landowners and neighbors to help one another, work with landowners to improve wildlife habitat and involve youth with habitat projects and wildlife education. They also organize forums for neighbors to come together and share information. In doing so, they all receive the mutual benefit of seeing more quail.

The foundation of the 2C Quail Cooperative is cooperation. Even the name was selected to symbolize this fundamental idea. "2C" indicates the mutual benefit desired: "to see" more quail. 2C also clarifies that everyone in Carroll and Caldwell counties can cooperate and play a role.

To get tips for developing a quail cooperative in your area, contact your local MDC private-land conservationist (PLC). Your PLC also can give you information about available incentive and cost-share programs and schedule a visit to evaluate and develop a plan to enhance the wildlife habitat on your property. To learn how to contact your local PLC, visit *www.mdc.mo.gov/landown/contacts/.*





Farmers' determination yields success

Creating and maintaining good quail habitat is hard, dirty and never-ending work—but, it pays off! Below are a couple of success stories from landowners who put in the time and are reaping the benefits.

Edge feathering pays off for a Macon County landowner

Jim Knowles purchased his Macon County farm in the late 1970s. At that time, quail were plentiful on his property and surrounding areas. However, as on many farms throughout the state, quail populations began to decline in the 1980s.

In 1995, Jim enrolled his cropland in the Conservation Reserve Program (CRP). He decided to plant a wildlife-friendly mix of warm-season grasses to attract more quail and other wildlife. He also signed up to plant the maximum acres of food plots to make sure his quail had plenty of food. Once the grasses and legumes were planted, quail populations started to increase.

When Jim heard about the positive effects of edge feathering, he decided to give it a try, also. He started off with a small project in 2005, feathering less than half an acre of woody draws. Within a month, there was a covey staying near the newly created cover. Encouraged, he edge feathered additional acres in 2006 and 2007. The results were the same. Jim says edge feathering has gained him two or three extra coveys. He's also observed that when quail flush from an open field, they fly straight to the edge feathering instead of the woods like they did in the past. Jim says, "It's hard to get them out of the edge-feathered areas, but that's exactly what it's supposed to do. It makes it harder for other predators to get them, too."

Quail return after a quarter-of-a-century absence

It had been 25 years since Oran Boulden had seen a quail covey on his farm. In fact, the population was so low, he had stopped hunting quail altogether. Then, in 2006 Oran enrolled in the Conservation Reserve Program. He planted warm-season grasses such as little bluestem, established filter strips and left buffers of warm-season grasses and wildflowers around his crop fields. He also edge feathered.

In late October, while planting wheat, Oran saw a covey of about 12 quail using the buffers at the edge of the field. The next spring, he saw a pair of birds using an area that he had edge feathered. "It's nice to see the work pay off," says Oran. "I know I have a long way to go, but I'm encouraged with the great start to bring quail back on my 160-acre farm."

To learn more about edge feathering and other quail-friendly practices, check out the Edge-Feathering Job Sheet at: *www.mo.nrcs.usda.gov/technical/forms/wildlife.html* or visit the Missouri Department of Conservation website *www.mdc.mo.gov/landown* for information on quail habitat restoration.

YOUR KEY to QUAIL HABITAT 2008

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